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A BRIEF INTRODUCTION TO THE CHINA GREAT WALL INDUSTRIES

The China Great Wall Industry Corporation (CGWIC), a subsidiary of the China Aerospace Corporation (CASC), is he sole industrial and trading firm in China which enjoys the right to bid on international commercial satellite launches and cooperational projects in space technology. Based on space technologies, the corporation has won a good reputation around the world through its successful launching of a number of spacecraft into space for foreign customers.

CGWIC is involved with the import and export of space systems as well as special equipment, precision machinery, instrumentation and electronics. In addition, it deals with contracts for international projects, labor export, technical transfers, cooperative production and joint ventures.

The China Great Wall Industry Corporation (CGWIC) was established in 1980. It is a technical and trading corporation which is a subsidiary of the China Aerospace Corporation (CASC). It is the only corporation in China which has the approval of the country to bid on foreign commercial satellite launches. The corporation also bids on international space technology cooperation project. As of the end of 1994, the CGWIC had accumulated almost two billion U.S. dollars in foreign exchange through exports. In 1994 its total imports and exports totalled 440 million U.S. Dollars.

Since its establishment, the CGWIC has established business contacts and relationships with hundreds of companies, scientific and technical organizations and international organizations in dozens of countries. This has been especially true since 1985 when China announced the entry of the Changzheng series rocket into the

international launch services market. By the end of 1994 it had successfully made nine launches of commercial satellites and payloads for foreign customers. It enjoys an excellent reputation in the international space community, science and technology community, business community and insurance community.

The CGWIC has 24 offices, sole invested companies, joint invested companies, and permanent trade organs in foreign countries. In China it has a number of different types of companies and subordinate organs which participate in international economic cooperation in space and other fields, domestic and foreign trade, import and export, storage and shipment of special products.

While providing space technology products and services, the CGWIC also imports and exports special types of equipment, precision machinery, instruments and gauges and electronic products, it contracts for scientific and technical information, construction, labor services, developmental technology transfers, carries out cooperative production, joint investment business, contracts processing of materials supplied by foreign businesses, according to provided drawings, assembles supplied parts, arranges investment and development, storage and shipment, international expositions and international travel.

During the past five years, the CGWIC has grown into a high science and technology trading company which combines technology, industry and trading which is fairly well known around the world. It is one of the leading import export enterprises in China. The CGWIC will continue to provide reliable, quality and effective services for its international and domestic customers as it has in the past, making contributions to mankind and the peaceful uses of outer space.

In September of 1994, with the approval of the state, The Space Great Wall Enterprises Group was organized around the CGWIC. The Space Great Enterprises Group is composed of the CGWIC, the China Precision Machinery Import and export Company, the China Space Industries Science and Technology Information Company, the Great Wall Industries Import and Export Company, the Great Wall International Economic and Technical Cooperation Limited Company, the Space International Travel Agency, the Great Wall Transport Services Center, the Guangzhou Space Communications Company as well as 13 regional companies including the Tianjin, Dalian, Haerbin, Shandong, Shanghai, Shanghai Pudong, Fuzhou, Xiamen, Guangzhou, Shenzhen, Zhuhai, Chongqing and Xian and industrial enterprises such as the Shenzhen Guangyu Industrial (group) Corporation, the Yunnan Space Industries General Corporation, the Hunan Space Changcheng Industries General Corporation, the Wuhan Yingwu Magnetic Tape Company, and the Liaozhou Changgong Machinery Manufacturing Company. It has 50 closely tied companies and 32 semi-closely tied companies and 12,000 employees.

Following the establishment of the Great Wall Enterprises Group, central leadership comrades personally wrote letters of support and encouragement. Premier Li Peng wrote, "develop a strong space enterprise in the midst of reform and liberalization." Vice premier Liu Huaqing wrote, "Create the undertaking of the Great Wall Enterprises for the development of space and of China." Vice Premier Deng Jiahua wrote "aim for the sky". Vice Premier Li Fengqing wrote "make the most of your advantageous situation to make even greater contributions toward the development of space enterprises." Member of the State Council Song Jianguo wrote, "With one heart and one mind, using common strategy and efforts, create even more benefits for the development of space." At the same time, members of the management agencies of the State Council also sent their congratulations. Ding Henggao, director of the

Commission for Science and Technology in the National Defense wrote "make the most of your advantages, and strive to create a first rate company." Minister Wu Yi of the Ministry for Foreign Trade and Economic Cooperation, wrote "create the Changzheng enterprises, and expand efforts in space." Director Liu Jiyuan of the State Space Bureau wrote "Thoroughly reform, struggle to be the best, and make new contributions to the development of space." These admonitions from the leaders of various levels were filled with hope for the China space enterprises, as well as concern and encouragement for the Space Great Wall Enterprise Group. The Space Great Wall Enterprise Group, based on the spirit of "independence and self sufficiency, creativity, unity and effective service", has continued to provide effective outstanding services to domestic and foreign customers, making even greater contributions to mankind and the peaceful utilization of outer space. It has proved itself worthy of the hopes and admonitions of the central leaders and high level leaders.

International satellite launch services are a major undertaking of the China Great Wall Industries Corporation.

On October 4, 1957, the former Soviet Union successfully launched the first man-made satellite into orbit. On January 31, 1958, the United States launched its first man-made satellite into orbit. Following this, France, Japan,China, England and India successively launched their own man-made satellites. There have now been thousands of space vehicles launched by a number of countries, most of which are various types of earth satellites. There have been approximately 900 communications satellites, including more than 200 synchronous orbit commercial communications satellites. These communications satellites have brought about a new era in world-wide satellite communications.

At the present time, the vast majority of nations around the world are using satellite communications. Dozens of satellite communications organizations have been established to manage and operate communications satellites. About two-thirds of all international telephone calls and all intercontinental television broadcasts are done using communications satellites. The annual income of satellite communications is now counted in the tens of billions of Dollars.

At the present time, the United States, France and China are the only countries capable of supplying international commercial satellite launch services. Before long, Russia and Japan will be added to this list.

According to incomplete statistics, France's Arien Rocket provides more than 40 percent of the international commercial launch services.

After the United States stopped using the space shuttle to launch commercial satellites, its Appolo and Delta rockets continued to provide more than 30 percent of the international commercial satellite launch services. In addition to the French and Americans, China's Changzheng series rockets, Russia's Dunzi (phonetic) rocket and Japan's upcoming H2 rocket are able to provide launch services.

At the present time, very little of the international commercial satellite launch market goes to anyone but the Europeans or Americans. Since China successfully launched its first self-designed rocket on June 29, 1964, it has independently developed the Changzheng-1, Changzheng-2C, the Changzheng-2E, the Changzheng-3, the Changzheng-3A and the Changzheng-4B carrier rockets, and is currently developing the Changzheng-3B and the Changzheng-3C

rockets. These have formed a Changzheng series of rockets capable of launching different types of satellites of different weights into precise orbits.

As of last year, China had used its own Changzheng rockets to launch more than 30 China-manufactured satellites and a number of foreign satellites. This marks China's entry into the international launch services market.

According to current launch contracts, between 1994 and the year 2000, the China Great Wall Industries Corporation will also launch a number of foreign satellites, including the INTELSAT-7A, the Asiasat-2, the United State's Aikeseda (phonetic) satellite and a number of other satellites. It should be stated that although china is due to launch a very small number of the satellites awaiting launch, we hope to be able to sign additional launch contracts. If earlier successes in launch services demonstrates that China is fully capable of standing alone in the fields of high science and technology, then in the future we will be able to provide even higher quality launch services to international customers. At the same time, further opening up international cooperation in satellite technology, making new contributions to world space technology and international space cooperation.

In its more than 10 years, and especially since representing China in its entry into the fiercely competitive international commercial satellite launch services market, it has it has enjoyed the support and cooperation of Chinese and foreign personages, contract partners and concerned departments, and we would like to take this opportunity to express our heartfelt gratitude.

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POSSIBLE MILITARY APPLICATIONS OF CIVILIAN SATELLITE REMOTE SENSING IMAGES

BY: Wang Jingquan

With the end of the Cold War and the changes in the world, a market for civilian satellite remote sensing images is being formed and expanding. More and more reconnaissance grade civilian satellite remote sensing systems are about to be placed into use, and there is more and more exchange of satellite reconnaissance information between countries, with an apparent trend toward commercialization and internatialization in satellite reconnaissance.

THE POSSIBILITY OF MILITARY ENCROACHMENT ON CIVILIAN SATELLITE REMOTE SENSING IMAGE MARKETS

The satellite remote sensing images which the United States originally placed on the market have primarily been pictures from the LANDSAT with resolution of 80 meters and 30 meters. The United States government has consistently prevented the sale of satellite pictures with resolution of better than 10 meters. There is also an agreement between the United States and France not to market with resolution better than five meters. However, with more and more nations attempting to gain entry to the satellite remote sensing market, this has forced companies to increasingly demand that the green light be given to high resolution images, and President Clinton announced a new policy on March 10, 1994, on the commercial exchange of high resolution spaced based images. This was that American enterprises need only submit requests to the Department of Commerce to obtain a business permit in order to be able to manufacture and operate high resolution remote sensing satellites and to sell the images to customers in the United States

and abroad. They only need request an export permit from the State Department, and they would be able to provide high resolution satellite systems to foreign countries with some restrictions. The United States government hopes that this new policy will be able to encourage enterprises to take the seize the lead in the world market for high resolution satellite images. So-called high resolution primarily refers to the capability of identifying a target one meter or larger, and based on experiences in the Gulf War, this type of image data can do a fairly good job in meeting theater requirements.

Prior to the late eighties, the former Soviet Union had already sold satellite pictures with a resolution of five meters. Later, Russia openly sold two meter resolution images on the world market. Not only was the resolution in these images the highest, but they were very cheap, with each image selling for between $1,000 and $5,000 each, with most selling for $1,250. However, sales were not very good, and the primary reason for this was the poor timeliness of the images delivered.

The French also plan to change the five meter maximum resolution of civilian remote sensing satellites. After their first generation Sibote (phonetic, possibly Sparta) satellite ten meter resolution full color and 20 meter resolution multiple light spectrum images have sold very well on the world market, by the year 2000 the French are going to launch their second generation Sibote-5 (phonetic) satellite, and its full color images and multiple light spectrum images will have resolution improved to five and ten meters.

The Japanese are currently developing a high resolution survey satellite (HIROS). This satellite will have 2.5 meter full color resolution and ten meter multiple light spectrum resolution

capabilities. South Africa plans to launch a 325 kilogram Greenstar remote sensing satellite in 1005 which will carry a 1.5 meter resolution visible light CCD camera and a 16.25 meter resolution dual band CCD camera. Germany is also developing an imaging satellite system with a one to two meter resolution. Those countries and regions which are developing their own system or are planning to purchase foreign satellite images include: Israel, United Arab Emirates, Kuwait, Saudi Arabia, Korea, India, Turkey, Spain and Taiwan.

ENTRY OF CIVILIAN SATELLITE REMOTE SENSING INTO MILITARY AREAS

1. United States

World Observation and Imaging Corporation. By early 1993 this company had already obtained a certificate of approval from the Department of Commerce for a satellite system for full color images with resolution of three meters and of multiple spectrum images with resolution of 15 meters, and had begun designing a satellite system with resolution of one meter.

Lockheed Corporation. On June 10, 1993, Lockheed requested and obtained on 22 April, 1994, a certificate of approval to manufacture and operate a commercial remote sensing satellite (CRSS) system with a resolution of one meter. In May of 1994 it established a subordinate company SII to conduct this project, spending four to five hundred million Dollars to develop a reconnaissance commercial remote sensing satellite system. this satellite system can provide full color images with resolution down to one meter and multiple spectrum images with resolution down to four meters. The time it took an individual satellite to revisit any given point on the surface of the earth was one to two days. In 1997 it began to launch these satellites, with the goal of

occupying 20 to 30 percent of the imaging market two years after the satellites were launched.

Mirror Corporation. This corporation requested a certificate of approval in November of 1993 and received it on May 6, 1994. The Eyeglass World Imaging Information System Satellite weighed 680 kilograms, had a resolution of one meter, and was capable of taking photographs at an inclination of 45 degrees up or down, left or right. It was capable of obtaining three dimensional photographs with a single orbit. It was capable of storing 60 images on the satellite, and the time it took to revisit any given point on the surface of the earth was two days. The first satellite was launched in early 1997. Later satellites will be equipped with multiple spectrum imaging devices or synthetic aperture radar with resolution better than 15 meters.

The Bao'er (phonetic) Universal Communications Corporation. This corporation plans to begin using two small satellites in 1997 to set up a system which provides full color imaging with resolution of one meter and color images with a resolution of five meters.

Other companies are also seriously considering these systems, feeling that they have an excellent future as either commercial, military or on the international market.

2. Russia

Russia is going to take two new steps in order to gain an even larger share of the market. One is to openly sell satellite images with a resolution of 0.75 meters, and the other is to develop a CCD live time transmission satellite with a resolution of better than five meters in order to keep one step ahead of Sparta.

3. France

In order to compete with the United States and Russia, the French Corporation Matela•Makeni (phonetic) Aerospace is prepared to use Apollo Reconnaissance Satellite technology to manufacture a new commercial remote sensing satellite with a resolution of one meter. The Diyupanguan (phonetic) X band synthetic aperture radar satellite in this plan has resolution of between three and five meters.

World industry is working to make civilian remote sensing satellite systems meet military requirements

The declassification of United States and Russian reconnaissance satellite images has sparked off a large international exchange of satellite remote sensing data, and heralded the formation and expansion of an international market for this. This implies that in the future, military use of satellite reconnaissance will, to a great extent, take advantage of commercial market resources of satellite remote sensing. This is one of the reasons why of the many different types of satellites, no new plans for an imaging reconnaissance satellite have emerged following the Gulf War.

However, there are a number of major problems which must be resolved if civilian satellite remote sensing images are to be better used in military applications.

Scientific and commercial applications of satellite remote sensing do not make any special demands of the processing speed and delivery of satellite images. However, these are the primary requirements for military applications. That is, image data delivery time must be short, and after simple processing they must

meet battlefield and tactical requirements. In late 1992 the Australian Remote Sensing Center installed a new super computer, and following this only 2.5 minutes were all that were necessary to obtain radar images from the European Remote Sensing Satellite or the Japanese Earth Remote Sensing Satellite with a resolution of 20 meters. In the past this would have required eight hours.

Also, after using a high speed processor and a distributed structure, the Norway Ground Station could process and fax to customer terminals over ordinary telephone lines images with a resolution of 100 meters within two hours of receiving data from the European Remote Sensing Satellite-1. If telephone line capacity were sufficient, it could process images of 20 meter resolution within the same time without any problems.

For the satellites themselves, a short revisiting time is the major index for increasing timeliness. This is especially true for theater commanders for whom it is of critical importance to receive images of the enemy situation every two to three days and not every two to three weeks. In order to shorten revisiting time, it is necessary to increase the image width of each pass. Using directional mirrors (having the satellite imager move back and forth) as do the Sparta and European Remote Sensing Satellites makes for side-looking capability, and greatly increases the width of the observed area. Therefore, its revisiting time is only one to four days, much shorter than the 16 days of the Earth Satellite. Solving this problem can allow civilian remote sensing satellite to better serve the military.

In addition, the United States is attempting to purchase Russian military satellite remote sensing images, using this cheap and easy method to obtain high resolution images. The United States military has also obtained through middlemen Russian fifth

generation reconnaissance satellite transmission type images with a resolution of two meters. The next step is to purchase Russian fourth generation (recoverable) satellites. These would be launched by Russia and after recovery the film would be handed over the American Air Force. In this manner, each satellite would only cost three Million Dollars. If Russia launched two to three of these satellites for the United States every year, the United States could save several hundred million Dollars. The United States Air Force is also studying how to use its Eagle Vision receiving stations to directly receive new types of remote sensing images with a resolution of five meters from satellites Russia will be launching in the late nineties.